

4270-137

Section I (Amendments to the Claims)

Please amend claims 1, 4-11, 26, and 30, and cancel claims 2 and 14, as set out in the following listing of the claims of the application.

1. **(Currently amended)** A gasketless fluidic interface comprising:
~~a microfluidic device having a plastically deformable an outer layer surface of a non-elastomeric material and defining a first aperture, the microfluidic device further having [[an]] a substantially enclosed internal microfluidic channel disposed substantially parallel to the outer surface layer and in fluid communication with the first aperture;~~
~~a retractable element external to the microfluidic device, the retractable element including a mating surface defining a second aperture, wherein the mating surface has having a raised feature protruding from the mating surface, and the raised feature comprises a continuous raised feature that surrounds the second aperture; and~~
~~a compression element adapted to depress means for compressing the raised feature into the outer surface layer to plastically deform the outer layer surface along the raised feature and thereby permit the transfer of fluid between the first aperture and the second aperture while preventing prevent unintended fluidic leakage between the mating surface and the outer surface layer adjacent to the first aperture, without collapsing the internal microfluidic channel.~~
2. **(Cancelled)** ~~The fluidic interface of claim 1 wherein the mating surface defines a second aperture and wherein the raised feature comprises a continuous raised feature surrounding the second aperture.~~
3. **(Original)** The fluidic interface of claim 1 wherein the microfluidic device is adapted to perform pressure-driven high performance liquid chromatography.
4. **(Currently amended)** The fluidic interface of claim 1 wherein the outer surface layer comprises a material that is substantially non-absorptive of, and is substantially non-degrading when placed into contact with, chemicals selected from the group consisting of: water, methanol, ethanol, isopropanol, acetonitrile, ethyl acetate, and dimethyl sulfoxide.

4270-137

5. **(Currently amended)** The fluidic interface of claim 1 wherein the outer surface comprises a material layer that is adhesivelessly bound to the at least a portion of microfluidic device.
6. **(Currently amended)** The fluidic interface of claim 1 wherein the outer surface layer comprises a substantially optically transmissive material.
7. **(Currently amended)** The fluidic interface of claim 1 wherein the outer surface layer comprises a polyolefin material.
8. **(Currently amended)** The fluidic interface of claim 1 wherein the mating surface comprises a first material having a first hardness, the outer surface layer comprises a second material having a second hardness, and the first hardness is greater than the second hardness.
9. **(Currently amended)** The fluidic interface of claim 1 wherein the compression element compressing means comprises a moveable element selected from the group consisting of: a pneumatic piston, a hydraulic piston, a rotary screw, a solenoid, and a linear actuator.
10. **(Currently amended)** The fluidic interface of claim 1 wherein the compression element compressing means is capable of applying a compressive force and translating any of the mating surface or the outer surface layer by a distance, the fluidic interface further comprising a sensor for sensing any of the magnitude of the compressive force and the translation distance.
11. **(Currently amended)** A gasketless fluidic interconnect comprising:
a substantially planar microfluidic device having a plurality of device layers and defining [[an]] a substantially enclosed internal microfluidic channel, the plurality of device layers including a plastically deformable an outer layer of a non-elastomeric material and defining a first aperture in fluid communication with the internal microfluidic channel;
a retractable mating surface external to the microfluidic device and defining a second aperture, the retractable element having a protruding feature aligned with the first aperture, wherein the protruding feature comprises a continuous wall that surrounds the second aperture;
and

4270-137

an actuator adapted to depress at least a portion of the protruding feature into, and to plastically deform, the outer layer adjacent to the first aperture to provide sealing engagement between the outer layer and the mating surface and permit the transfer of fluid between the first aperture and the second aperture.

12. **(Original)** The fluidic interconnect of claim 11 wherein the microfluidic device is operated at an elevated internal operating pressure, and sealing engagement is maintained between the outer layer and the mating surface at an operating pressure of at least about 100 psi.

13. **(Original)** The fluidic interconnect of claim 11 wherein the microfluidic device is operated at an elevated internal operating pressure, and sealing engagement is maintained between the outer layer and the mating surface at an operating pressure of at least about 500 psi.

14. **(Cancelled)** ~~The fluidic interconnect of claim 11 wherein the mating surface defines a second aperture, the protruding feature defines a continuous outer perimeter, and the second aperture is disposed within the continuous outer perimeter.~~

15. **(Original)** The fluidic interconnect of claim 11 wherein the microfluidic device is adapted to perform pressure-driven high-performance liquid chromatography.

16. **(Original)** The fluidic interconnect of claim 11 wherein each of the outer layer and the mating surface comprises at least one material that is substantially non-absorptive of, and is substantially non-degrading when placed into contact with, chemicals selected from the group consisting of: water, methanol, ethanol, isopropanol, acetonitrile, ethyl acetate, and dimethyl sulfoxide.

17. **(Original)** The fluidic interconnect of claim 11 wherein the outer layer comprises a substantially optically transmissive material.

18. **(Original)** The fluidic interconnect of claim 11 wherein the outer layer comprises a polyolefin material.

4270-137

19. **(Original)** The fluidic interconnect of claim 11 wherein the mating surface comprises a first material having a first hardness, the outer layer comprises a second material having a second hardness, and the first hardness is greater than the second hardness.

20. **(Original)** The fluidic interconnect of claim 11 wherein the actuator comprises any of a pneumatic piston, a hydraulic piston, a rotary screw, a solenoid, and a linear actuator.

21. **(Original)** The fluidic interconnect of claim 11 wherein the actuator is capable of applying a compressive force and translating any of the mating surface or the outer layer by a distance, the fluidic interface further comprising a sensor for sensing any of the magnitude of the compressive force and the translation distance.

22. **(Withdrawn)** A method for interfacing with a microfluidic device, the method comprising the steps of:
providing a multi-layer, substantially planar microfluidic device defining an internal microfluidic channel and having a outer layer defining an first aperture in fluid communication with the channel;
providing a mating surface having at least one protruding feature;
aligning the protruding feature with the aperture; and
depressing at least a portion of the protruding feature into the outer layer to plastically deform the outer layer adjacent to the aperture and thereby prevent unintended leakage between the mating surface and the outer layer.

23. **(Withdrawn)** The method of claim 22 wherein the at least one protruding surface defines a second aperture, the method further comprising the step of either supplying or receiving a pressurized fluid through the second aperture.

24. **(Withdrawn)** The method of claim 22 wherein the depressing step includes the application of a compressive force, the method further comprising the step of sensing the magnitude of the compressive force, wherein the depressing step is responsive to the sensing step.

4270-137

25. **(Withdrawn)** The method of claim 22 wherein the depressing step includes translating any of the mating surface or the outer layer by a distance, the method further comprising the step of sensing the translation distance, wherein the depressing step is responsive to the sensing step.

26. **(Currently amended)** A system for performing high throughput pressure-driven liquid chromatography, the system comprising:

a microfluidic device having a plastically deformable an outer layer surface of a non-elastomeric material and defining a plurality of device apertures, the microfluidic device further having a plurality of parallel substantially enclosed internal separation columns adapted for parallel operation and in fluid communication with the plurality of apertures;

a retractable seal plate external to the microfluidic device, the retractable seal plate including a mating surface having a plurality of raised features protruding from the mating surface, wherein each mating surface defines a seal plate aperture registerable with a corresponding device aperture of the plurality of device apertures, and each raised feature comprises a continuous raised feature that surrounds a seal plate aperture; and

an actuator adapted to depress at least a portion of the plurality of raised features into, and to plastically deform, the outer surface, layer adjacent to the plurality of device apertures to provide sealing engagement between the outer surface layer and the mating surface, and to permit the transfer of fluid between each seal plate aperture and a corresponding device aperture.

27. **(Original)** The system of claim 26, further comprising at least one pressure source in fluid communication with the plurality of parallel separation columns.

28. **(Original)** The system of claim 27, further comprising a fluidic distribution network permitting fluid communication between the at least one pressure source and the plurality of separation columns.

29. **(Original)** The system of claim 28 wherein the fluidic distribution network is disposed within the microfluidic device.

30. **(Currently amended)** The system of claim 26 wherein each of the outer surface layer and the mating surface comprises at least one material that is substantially non-absorptive of, and

4270-137

is substantially non-degrading when placed into contact with, chemicals selected from the group consisting of: water, methanol, ethanol, isopropanol, acetonitrile, ethyl acetate, and dimethyl sulfoxide.

31. **(Withdrawn)** A method for manufacturing a fluidic seal plate comprising a plurality of aperture-defining raised annular features protruding from a first surface, the method comprising the steps of:

- providing a workpiece;
- providing an endmill including a cutting surface having a center, the cutting surface defining at least two indentations disposed substantially equidistantly from the center;
- rotary cutting the workpiece using the endmill to expose the first surface at a first location and to define a first raised annulus protruding from the first surface;
- rotary cutting the workpiece using the endmill to expose the first surface at a second location and to define a second raised annulus protruding from the first surface; and
- defining a first aperture and a second aperture in the first surface, the first aperture being surrounded along the first surface by the first raised annulus and the second aperture being surrounded along the first surface by the second raised annulus.